MURPHY (J. B.)

APPENDICITIS.

Further Consideration of this Subject, with Tabulated Report of Cases not Previously Published.

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FROM

THE MEDICAL NEWS,

January 5, 1895.

[Reprinted from THE MEDICAL NEWS, January 5, 1895.]

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IN order better to appreciate the trend of thought and practice on the subject of appendicitis at the present day, it will be greatly to our advantage to take a view of the work of the last five years. There has been no controversy in the history of medicine in which the struggle has been so intense between the surgeon and the physician as on that of appendicitis. Both parties have been honest in their convictions, and both equally positive that they are right. We naturally seek an explanation for this diversity of opinion as well as action, and the explanation is not difficult to discern. Differences of opinion as to the clinical course and probable results with operative and non-operative treatment have been almost entirely due to erroneous notions of the pathologic conditions.

Up to five years ago we had of the pathology of appendicitis practically no other but that of the post-mortem table; that has to-day been almost entirely

[1] Read before the Chicago Pathological Society, December 10, 1894.

superseded by the teaching of the operating-table. To-day we observe on the operating-table pathologic changes almost from the moment of their beginning until the destruction of the parts concerned is complete, whereas formerly we had deductions, and these very erroneous ones, from conditions that existed before the pathologic changes ensued which produced death. From results found post mortem we inferred the cause and course, and here was the source of error; to-day we observe the disease in the various stages of its progress from its inception to the final result. We are therefore preëminently qualified to arrive at a correct conclusion, inasmuch as our opportunities are so much greater for observing pathologic changes as they progress.

Now, on what points have the surgeon and the physician differed, and what has led to the diversity of opinion?

In 1888, when Kraft wrote his excellent monograph on appendicitis in *Volkmann's Vorträge*, it was the prevalent opinion of the profession all over the world that the vast majority of diseases in the sacro-iliac region were due to cecitis, an inflammation of the cecum or its surrounding tissues as a result of disease of that viscus, and it was variously known as typhilitis, perityphilitis, and cecitis.

Then, after Kraft's announcement, physicians gradually yielded point after after point until finally to day it is agreed that all except 2 per cent. of the inflammatory pathologic lesions about the caput coli are due to primary lesions of the appendix.

We may now regard the first point as practically settled.

The next argument advanced on theoretic considerations was that the appendix in inflammatory in-

fections becomes swollen, and relieves itself by the discharge of its inflammatory products through its normal opening into the intestine, thus effecting a cure. What have we learned from observations at the operating-table? That in inflammatory lesions of the appendix the canal is rarely relieved of its inflammatory products in the way suggested, but is relieved by a necrosis of its wall and perforation. This is followed by the formation of an abscess and subsequent necrosis of the attached wall of the viscus to which it is adherent, the contents of the abscess escaping into the intestine.

The next contest was over the presence or absence of pus outside of the appendix in the majority of acute cases. Observation in operations has shown that in the acute stage pus is found outside of the appendix in 94 per cent. of the cases; that the existence of pus outside of the appendix does not demand a perforation of that organ for its production. That infection of the peritoneum and the formation of a peri-appendicular abscess may occur with an internal ulceration of the appendix and no perforation, I have shown by cases reported in the *Journal of the American Medical Association*, March 3 to 24, 1894. In that paper this pathologic condition was for the first time mentioned in the literature. While the profession was not prepared to believe that pus was present in the form of a circumscribed peri-appendicular abscess in practically all of the cases of acute appendicitis, it had been acknowledged for many years that in some cases abscess occurred around the caput coli, which emptied into the intestinal tract, and the patient recovered. We know now that this is the course in the very great majority of cases.

The last and final questions, and those on which the controversy is still spirited, are (*a*) the pathologic changes produced by perforation of the appendix into the peritoneal cavity; (*b*) the likelihood of that perforation, and also perforation of the circumscribed abscesses about it into the peritoneal cavity; (*c*) the immediate and remote symptomatic and physical manifestations of the latter, and (*d*) the ultimate result of such rupture.

The pathologic changes produced depend, first, on the character of the material admitted into the peritoneal cavity, *i. e.*, whether the contents of the appendix or abscess consist of (*a*) pus or débris in which the staphylococcus predominates; (*b*) whether the streptococcus predominates; (*c*) whether the bacillus coli commune exists in its virulent or inert condition, and (*d*) whether the pus, in which any or all of these may have existed, has become innocuous; second, on the quantity of material admitted at one time into the peritoneal cavity; and third, on the condition of the peritoneum at the time of admission of pus.

I have observed in patients, and demonstrated experimentally, that pus in which the staphylococcus and the inert bacillus coli commune predominated could be free in the peritoneal cavity for a long period of time, and produce but very slight changes in the peritoneum, *i. e.*, that the intestine may be bathed in pus of this character for days without excoriating the endothelium of the peritoneum. I have observed a pint of pus of this character in the peritoneum of a patient in whom the history showed conclusively that it must have been present for five days, and upon opening the peritoneal cavity the normal gloss of the peritoneum of the

bowel was still maintained. I have taken this pus and produced cultures with it, which demonstrated its character, and injected one dram of the pus as removed from the peritoneal cavity into the peritoneal cavity of animals, both with and without mechanical abrasion of the peritoneum, without producing the least unpleasant symptom, and no pathologic lesions were found on making an autopsy.

In cases of general suppurative peritonitis, as a result of appendicitis, that have been under my observation, in which the normal glistening appearance of the peritoneum was present at the time of operation, the patients recovered, and inoculations of the pus into the peritoneal cavity of animals produced no unpleasant symptoms or lesions. When I find that the pus has not abraded the peritoneum, even though the surface of the latter has been covered with the former for a length of time, I consider the case a favorable one.

Note how this contrasts with the appearance in the abdomen when the streptococcus predominates. Here we find that, within a short time after rupture into the peritoneal cavity, the peritoneum in contact with the infectious material is entirely denuded of its endothelium, resembling the condition produced by a cantharides blister. The quantity of pus is always small, rarely exceeding a few drams, with here and there flakes of lymph. The bowel is distended and paralyzed; peristalsis has ceased. Inoculations with this pus produce the same condition; the red and angry appearance of the intestine I now recognize as a signal of the gravest importance, as, practically, all of my cases in which this condition was present terminated fatally.

The septic conditions due to the bacillus coli commune produce about the same physical manifestations as those of the streptococcus. The quantity of material discharged into the peritoneal cavity is of great significance; if it be small the intestines and omentum rapidly circumscribe it and protect the general peritoneal cavity from invasion. If it be large, and if it be irritating and poisonous, it may abrade the peritoneum of its endothelium as boiling water would, quickly, and be followed by a rapid absorption, causing death in a few hours. I have had only one case of this class, in which an abscess of considerable size ruptured into the peritoneal cavity. Within two hours the extreme symptoms of shock were present, and in twelve hours the patient succumbed. If a large quantity of pus of a low septic character be admitted into the peritoneal cavity it may remain in that cavity for days, and produce but slight changes. Finally, from some cause, this material, which had been innocuous, suddenly produces grave conditions and symptoms.

It is a matter of deep-rooted belief that a peritoneum that has been irritated repeatedly by the presence of a tumor, by the close proximity of an accumulation of infectious material, finally attains an increased resistance against infection, *i. e.*, the peritoneum of a patient who has suffered from the presence of a large and movable tumor will tolerate much more manipulation than a perfectly normal peritoneum, and that the peritoneum in the neighborhood of an old circumscribed abscess is more difficult to infect than a healthy peritoneum.

There has been a great difference of opinion as to the symptoms of appendicitis and the relation of the symptoms to the pathologic condition within.

This diversity will continue until our power of differential diagnosis is very much increased. From a train of symptoms and signs in the early stage it is impossible to say just what is the exact pathologic condition. We can say, however, that it is a disease of the appendix in some stage of its development.

The symptoms of appendicitis are (1) a sudden pain in the abdomen; (2) shortly followed by nausea and, perhaps, vomiting; (3) local tenderness over the site of the appendix, and most frequently in the right iliac region; (4) elevation of temperature. These symptoms, occurring in this order, without a previous history of genito-urinary infection, or of a lesion of the gall-tracts, or Pott's disease, indicate with almost uniform regularity appendicitis. They do not indicate that the appendix is gangrenous, or that there is a simple catarrhal appendicitis. They do not indicate whether it has perforated or has not perforated; nor whether the cause is an infection with the staphylococcus, the streptococcus, or the bacillus coli commune, or the presence of a fecal stone, or of a foreign body. They do not indicate whether it is a stenosis of the appendix or an appendicitis obliterans, but merely that it is an appendicitis or acute disease of the appendix.

The physical manifestations, the presence or absence of induration, tumefaction, edema of the wall, tympanites, etc., aid in the differentiation of the various pathologic conditions present in the more advanced stage; but all of these are absent or comparatively worthless in the early stage.

The etiology, which was for a long time a subject of contention, is now practically agreed upon.

It was very difficult to eradicate from the professional mind the deep-rooted erroneous belief that in a great majority of cases appendicitis was due to foreign bodies admitted into and retained in the appendix, as grape-seeds, cherry-stones, fragments of bone. Only 2 per cent. are cases with foreign bodies, and fecal stone in 38 per cent. To indicate the causes of appendicitis I will use the same classification employed in my article of March 3, 1893:

1. Simple pus-infection, producing the catarrhal variety.

2. Extensive infection by the bacillus coli commune or by pyogenic microbes, producing gangrene of a greater or lesser portion of the appendix.

3. Pressure-atrophy with infection of the appendix (*a*) by fecal concrement, and (*b*) by foreign bodies.

4. Retention-accumulations (*a*) from cicatricial contractions, stenosis, and obliteration, and (*b*) from occlusion by an enterolith or foreign body.

From the reports of autopsies collected I find that in 70 per cent. of the cases there were perforations of the appendix. Of my own cases in which the appendix was removed there was 87 per cent. Simple primary catarrhal appendicitis, if it exists, is rarely brought to the attention of the physician and still less frequently to that of the surgeon. Of 194 cases reported we had but one of this variety. A catarrhal inflammation in which the more serious form of appendicitis had previously existed is not uncommon.

The question of greatest practical importance to the surgeon and physician is the diagnosis. Can we determine when appendicitis is present, and can we determine the pathologic conditions that exist in

the abdomen at any given time in the progress of the disease? To the former we must with positiveness answer in the affirmative; to the latter an equally forcible negative must be given; that is, we can say from the symptoms that a lesion of the appendix exists; but we cannot say, in most cases, how extensive, how dangerous, and how far-reaching the effects of that appendicitis may be, and still less can we say in any given case how soon the life of the patient may be greatly jeopardized by the disease which at the moment has apparently no grave danger.

If we were able to determine in the early stage, from the symptoms, physical signs or clinical history of a given case that it is going to take a favorable or an unfavorable course, we would regulate our treatment accordingly. Unfortunately, there are no symptoms present in the dangerous cases admonitory of their fatal termination until the patient has passed beyond the condition in which an operation offers reasonable hope of a recovery. The question to be answered is, When should we operate? The so-called conservative answers: "Operate on the collapsed cases; the cases that present symptoms of fulminating peritonitis; the cases that are taking an unfavorable course; the cases that appear to be progressing rapidly to destruction under medical treatment."

The surgeon must take a positive stand, and answer "No" to each of these rules. It is admitted that 50 per cent. of the fatal cases terminate before the end of the sixth day, many on the fourth, and a smaller number on the second. The surgeons who wait until the sixth day must, therefore, expect to have a mortality of 50 per cent. of all the cases

that would die without operation. I believe the proper position for the true, earnest, and advanced medical man is expressed by the eminently scientific and truly conservative physician, Dr. Norman Bridge, in the following words: "Appendicitis is one of the most frequent and dangerous of the inflammatory diseases in or about the peritoneal cavity. We do not know the line between proper medical treatment and the demand for surgical interference, and I rather despair of finding it. The medical man is practically powerless to control the destiny of the patient. It is always a surgical disease, and the mortality should be materially lessened by skilful surgical treatment."

Would you delay operation on a case that is progressing favorably? By that I mean a case in which the temperature is not above 99°, the pulse not above 80, the expression good, the abdomen presenting no alarming signs? No; I have seen cases of this class go to the third, the fourth and the fifth day with all of the most favorable symptoms that could well be imagined, and on the sixth day die. From what? From a suppurative peritonitis that had existed all the time, as shown by the pathologic changes found in the peritoneum.

We have no sign, symptom or combination of signs and symptoms that indicate, with any degree of certainty, suppurative peritonitis in the cavity stage.

It may exist and the free peritoneal cavity contain drams of pus with a temperature of 99°, a pulse of 80, and a good facial expression. Note the following case that occurred in the practice of Dr. James G. Berry:

G. F., aged nineteen, weighed 220 pounds. On the morning of September 8th, after breakfast, he

was attacked with a severe pain in the abdomen, followed shortly by vomiting, and the pain and discomfort were sufficient throughout the day to prevent the man from attending to his work. He remained about the same during the night, and the following morning at 10 o'clock, twenty-six hours after the onset of pain, he walked a couple of blocks to the drug-store and consulted the druggist concerning his trouble, who advised him to see a doctor, and he was seen by Dr. Berry at 3 o'clock, and the diagnosis of appendicitis was made. His pulse, when seen by Dr. Berry was 140, and temperature 102°. There was no tympanites; there was increased local tenderness over the region of the appendix; peristalsis was absent; the patient's countenance was good, and he expressed himself as tolerably comfortable. At 4 o'clock, assisted by Drs. Berry and McQuaig, I performed celiotomy. On opening the peritoneum pus flowed out. There were no adhesions whatever between the intestines; the appendix was free; a fecal stone protruded from an opening in the side of the appendix, where it produced pressure-atrophy perforation. The abdominal cavity was sponged; pus was found down in the pelvis; drainage was by gauze. The normal gloss of the intestine was not disturbed in the least by the presence of the pus, and the surface was not even red. The patient made an uninterrupted recovery.

It will be noted that the operation was performed thirty-three hours after the onset of the symptoms, and but a few hours after the patient had been walking in the street with a suppurative peritonitis. What would have been his condition if the operation had been delayed twenty-four or forty-eight hours? The answer is self-evident.

A retention-appendicitis, on the other hand, may produce a temperature of 105°, or even higher, enormous tympanites and a pulse of 140, an anxious

facial expression, and all of the so-called classical symptoms of peritonitis, and the peritoneal cavity be free from infection. These are extreme pictures, but they occur.

When should we operate? As we are unable from the signs and symptoms to determine the exact pathologic condition, are we justified in allowing the probability of fatal conditions to continue for such a period of time without action as would place the patient beyond the possibility of rescue even by operative procedure? No! Until such time as the physician is able to determine the exact pathologic condition and danger in the individual case (and, indeed, we must now consider that time far distant), he is not justified at the peril of the patient's life in restraining the surgeon from acting. It must be conceded by all that an operative procedure, in competent hands, is in itself one involving very little risk, while the continuation of the pathologic processes in many cases greatly jeopardizes the life of the patient. There is only one safe position to take, and that is, in every case in which a diagnosis of appendicitis is made the operation should be immediately performed. It is true that many cases can recover without operation; but we cannot differentiate, in the early stages, which cases are going to be the favorable ones. It is further true that the earlier the operation is performed the less the danger to the patient and the greater the ease of removing the appendix. In a great majority of cases, if an operation be performed within forty-eight hours after the onset of the symptoms the appendix is not yet ruptured, and can be removed without pus-infection of the peritoneum, an advantage of which even the boldest surgeon is pleased to avail himself.

The following case in the practice of Dr. J. H. Hoelscher is a beautiful illustration of this class:

Date of operation, November 10, 1894. Operator, Dr. J. B. Murphy with Dr. Hoelscher. Diagnosis, appendicitis.

Miss T., aged sixteen, was perfectly well up to 4.30 P.M. November 9th, when she was attacked with pain in the abdomen, which persisted and increased in severity, compelling her to go to bed. She began to vomit at 8.30 P.M., and vomiting and pain continued through the night and up to the time of operation. At 11.30 that night, when seen by Dr. Hoelscher, the temperature was normal. The diagnosis of appendicitis was made. At 8 A.M., November 10th, the temperature was 99.5°, the pulse 90; at 11 A.M., the time of operation, the temperature was 100°, the pulse 110. There was great tenderness over the region of the appendix; but insensitiveness in other parts of the abdomen. There was no tympanites; peristalsis was absent in close proximity to the appendix; the expression was good.

Operation was by the lateral incision. The appendix was covered entirely by visceral peritoneum adherent to the posterior surface of the cecum up on to the ascending colon. The end was enlarged to half-an-inch in diameter, and contained no fecal stones, but was full of pus; gangrene of the mucous membrane was commencing; lymph-flakes existed in the outer wall of the appendix. The appendix was ligated and removed without rupture, the peritoneum sewed over, and gauze drainage inserted. The patient made an uneventful recovery.

In the later stage, if the surgeon is unfortunate enough to be called at that time, when the peritoneum is flooded with pus, and the patient in collapse, it is his duty to perform the operation and give the patient the advantage of the small percentage in his favor in this forlorn condition.

The rule, first, last, and always should be: Operate in every case of appendicitis, promising or unpromising, at the earliest possible moment. What operation shall we perform? The incision should be made a little toward the median line from the highest point of induration, parallel to the rectus; the muscular layer should be separated with the handle of the scalpel parallel to the course of the fibers, as advised by McArthur and McBurney, thus lessening the liability of hernia. The opening must be ample to allow the surgeon to perform the work within with ease. In the early cases the appendix should be removed, as the adhesions are friable and permit of the appendix being readily separated and drawn into the field. The parallel band of fibers on the cecum opposite its mesentery can always be followed to the position of the appendix, and is an infallible guide to its location. If the peritoneal cavity be opened before the abscess is reached, as is always desirable in the early stage, a thorough packing of gauze should be made around the induration to prevent the pus from entering the unaffected portion of the peritoneum. This I consider of very great importance, and I make an effort to enter the peritoneal cavity just to the side of the adhesions, so as to open the unaffected portion of the peritoneal cavity before I open the abscess; in that way the adhesions may be located, and the packing well placed, so as to thoroughly protect the peritoneum before the adhesions are torn.

In the later cases, that is, from the seventh day on, I consider it advisable to open directly into the abscess when adhesions are present, drain the abscess, remove the fecal stone, if one be present, and make no effort to remove the appendix. The appen-

dix in the acute cases should be simply ligated with chromicized catgut; no effort should be made to top-sew it or bury it in the cecum. Occasionally there will be a fecal fistula, but that closes in a very few days itself.

In the cases of appendicitis operated on in the intermediate stage, *i. e.*, between the attacks, a cuff should be made of the peritoneum of the appendix, peeling the peritoneum back one-half inch or more; the muscular layers should be ligated and the cuff drawn back over the stump of mucous membrane and ligated. The pus should be carefully sponged out of the cavity, and no water or disinfecting solutions used; do not waterlog the peritoneum, as it is sufficiently taxed in taking care of the pus without this additional labor. A glass drain and a gauze drain should both be used in all cases in which pus is present at the time of operation or in which there has been a recent attack of appendicitis. The drain can be removed in eight or ten days, as the cavity fills up from the bottom.

This, in short, is an outline of the procedure I follow. All of the minor details cannot be mentioned here. There is no operation in the peritoneal cavity in which the patient's life is so completely in the hands of the operator, in which the errors of doing too much or too little work would be so likely to result fatally, as in the operation for appendicitis with its multiform and complicated pathologic conditions. The result depends in a very great degree on the extent of the invasion, and the latter upon the period of time that has elapsed since the onset.

In speaking of results, I do not mean the results in recurring appendicitis, the simplest and least dangerous variety of all; I mean the results in all

cases, from those of general suppurative peritonitis as a sequence of appendicitis, to those of the simplest catarrhal variety.

There is a growing tendency in the profession to shirk the responsibility of operating when the dangers are great, *i. e.*, to defer operation on the most dangerous cases and advocate operation on the obliterated or stenosing recurrent varieties in which there is the least danger to the life of the patient from the disease. We must not swerve from our obligations to our patients, but should make every effort to rescue them regardless of the praise or condemnation bestowed upon us.

In reporting cases it is the duty of every operator to classify or mention in detail the important or common symptoms of each individual case in a tabulated form, and give an abstract of the history and pathologic conditions, that the analytical mind in reviewing the results obtained by individual operators may be able to explain the cause of success or failure when the operator himself is not able to do so. It is, therefore, the duty of every surgeon in writing on this subject to give sufficient details of his cases to enable the reader to judge whether they were of the grave or mild variety; whether they were all cases of recurrent, simple, adhesive appendicitis, or whether many of them were of the gangrenous, perforative, and malignantly infectious variety, with the peritoneum extensively involved.

I shall endeavor to give a short outline of the various conditions found in operating for appendicitis.

1. When the abdominal wall is infiltrated, and the abscess is opened without opening the unaffected

portion of the peritoneum, there may be (*a*) a small circumscribed abscess, with the appendix forming part of the wall; (*b*) a small abscess, with a tract leading to a larger abscess more deeply; (*c*) a large abscess filling the iliac fossa, containing fecal concretions, or a gangrenous appendix floating in the pus, all closed in with firm adhesions. (This condition never exists in the early stage, and in this class of cases the adhesions protecting the peritoneum should never be broken to remove the appendix.) (*d*) There may be multiple abscesses, with no connecting sinuses. This is a comparatively rare condition. In one of my cases a second abscess was not opened, and the patient died of pyemia four weeks later. (*e*) There may be an abscess in the opposite side of the abdomen; it usually appears in the same relative position, to the left anterior superior spinous process, as the abscess does to the right. There is no connecting sinus. It never occurs in early cases, and is more commonly found a week after operation and three or four weeks after the onset of attack, and should be opened and drained.

2. In another class of cases, when the peritoneum is opened and no adhesions to the anterior abdominal wall are found, a circumscribed abscess may be found situated on the posterior wall of the abdomen, the appendix and pus surrounded and walled in by adherent omentum and intestine. This is the most common condition found in the early stage. The location of the abscess may be near the median line near the margin of the pelvis, close to the crest of the ileum, over the kidney posterior to the cecum, or on the margin of the liver, as in two cases. The occurrence of a suppurating appendix on the surface of the liver or adherent to its margin is due to the

congenital deformity and malposition of the cecum, so perfectly described by Cushmann, and the distention of the colon with gas does not aid in making a differential diagnosis between appendicitis and cholecystitis. Still, the most frequent location for the appendix is in the neighborhood of the McBurney point. The exact position of the appendix can be found by following the white fibrous bands along the convex surface of the cecum to the base of the appendix. In all of these cases the field of operation should be thoroughly protected by carefully packing with strands of iodoform gauze, retaining the ends outside. The adhesions are separated, the pus sponged out, and the appendix liberated from its adhesions; a ligature is then placed on the appendix, and one on its mesentery. In all the cases in which the peritoneal cavity is opened directly the appendix should be removed. When the appendix is situated above and behind the cecum, in close proximity to the liver, the induration can be detected behind the cecum, and must be reached by pressing the cecum forward, packing around, and opening the abscess, locating the appendix, and removing it.

3. When the abscess is circumscribed in the pelvis, and the appendix is found hanging over the brim, or attached to the uterus, the tubes, or the ovaries, the appendix is located by following the bands on the cecum; pus should be sponged out, the appendix amputated, and a long glass drain inserted.

4. In another class of cases the peritoneal cavity will be found to contain a large quantity of free pus with no limiting adhesions, and the bowel may be smooth and glossy, not in the least congested or

eroded of its endothelium. All of these cases recover. On the other hand, the bowel may have a livid, blistered appearance, entirely excoriated of its endothelium, and very much distended, showing a paralysis of its muscular walls. The great majority of such patients die. In either of the cases stated the appendix may be adherent or free; it is usually perforated and gangrenous. In both, the appendix is located by the fibrous bands on the cecum or by the sensation to touch by its swollen, hard, and enlarged condition; it must not be confounded with the indurated omentum. Extensive drainage, both of glass and gauze, should be employed, and no irrigation.

5. We find a class of cases in which there is a small quantity of pus located around the appendix, with partial adhesions protecting the peritoneum, and with flakes of lymph extending some distance. This condition may be caused by a perforation of the appendix; by gangrene of the mucous membrane, local or general, without perforation; by a simple ulcer of the appendix without perforation; by accumulation and retention of muco-purulent material in the appendix, with only an abrasion of the mucous membrane of that organ.

6. Specific ulcers in the appendix without perforation or infection of peritoneum, as (*a*) tuberculous, of which I have had one case with recovery; (*b*) typhoid, three cases, all recovered. Both of the latter conditions produced all the acute symptoms—pain, vomiting, tympanites, and elevation of temperature. In these cases, when the appendix is located at the time of operation, it will be found very much enlarged at the seat of ulceration, with the distal end distended with accumulation.

7. There is a class of cases in which the canal of the appendix is partially or completely obliterated or stenosis of the canal is produced sufficient to cause retention of material in the distal end, causing recurrent attacks. In one of the cases of this kind there was a fecal stone entirely surrounded by connective tissue, the mucous membrane having been completely destroyed and the canal obliterated in a previous attack; there were no adhesions around the appendix. In many other cases portions of the canal were found obliterated, and in others a stenosis or narrowing of the canal; the latter is the most annoying variety, as there are frequent recurrences of attacks, and the patient is rarely ever free from pain or sensitiveness in that region. As far as I can learn from the literature, the credit belongs to Dr. Henry O. Marcy, of Boston, for being the first to perform the operation of appendicisectomy in the intermediate stage for the relief of this class of cases. The operation was on Dr. Samuel B. Nelson, November 9, 1886, and the report was published in the *Boston Medical and Surgical Journal* at that time. The patient recovered, and left the hospital in eighteen days.

8. *Appendicitis stercoralis.* In this class of cases there is a large accumulation of feces surrounded by mucous or muco-purulent secretion. The attacks of pain are severe and recur frequently. They are usually accompanied by a temperature not exceeding 100° or 100.5°, and vomiting is a very pronounced symptom. The attack resembles one of intestinal retention, as frequently a movement of the bowels cannot be produced for four or five days. The cause of the symptoms of intestinal obstruction has not been clearly explained, but I believe them to

be reflex phenomena, as we find exactly the same condition produced in obstruction of the ductus cysticus with gall-stones. The appendix in cases of this kind is very much enlarged at the distal end, small at the proximal end; its mucous membrane is thickened, and it contains a large quantity of hardened feces.

The mortality in my cases, including all grades, and operating on every case of appendicitis, favorable or otherwise, which came under my observation, is 9.6 per cent. The total number of cases operated on to date is 194. The table on the preceding page is a tabulated form of the cases operated on since my publication, March, 1894.

In the literature of this subject I wish to call attention particularly to the contributions, each presenting various phases of the disease to greater advantage than the other, of Kraft, McBurney, Maurice Richardson, Bryant, Shrady, Wyeth, Sonnenburg, Robert T. Morris, Senn, and McArthur.

Number of case.	Date of operation. (1894.)	Name, sex, and age of patient.	Operator.	Number of attacks before operation.	Ulcerative appendicitis.	Gangrene of appendix.	Perforation of appendix.	Tuberculosis of appendix.	Appendix non-adherent.	Appendix adherent	Enterolith.	Time of operation after attack (days.)	Recurrence after simple drainage.	Rupture of abscess into urinary bladder.	Circumscribed abscess; peritoneal cavity not opened.	Abscess intra-peritoneal; peritoneal cavity opened.	Septic peritonitis without limiting or with incomplete limiting adhesions.	General septic peritonitis with no adhes.	Gen. sept. perit with incomplete adhes.	Rupt. of circum. absc. into perit. cavity.	Appendicsectomy during attack.	Appendicsectomy between attacks.	Fecal fistula.	Fatal sapremia.	Recovery.	Death: hours after operation.	Sudden pain in abdomen.	Nausea or vomiting.	Local tenderness (increased).	Temperature.	Induration.	Dry septic peritonitis.	Abscess-cavity comm'cating with bowel	Remarks.	Case referred by
146	May 18	J. T., M. 50	M.	3	...	...	...	...	...	1	...	10	...	...	1	...	...	...	...	...	...	...	...	...	1	1	1	1	100	1	...	...	Abscess close to liver, behind colon.	Dr. Thometz.
147	" 24	C. C., M. 36	"	3	...	...	...	...	...	...	...	11	...	...	1	...	...	...	...	...	...	...	...	...	1	1	1	1	99½	1	...	...	.....	" Piper.
148	" 26	Mrs. T., 28	"	...	1	1	1	...	1	...	...	11	...	...	...	1	...	1	...	...	1	...	...	1	13	1	1	1	103	...	..	...	Moribund at time of operation; did not rally.	" Neal.
149	" 28	L., M. 56	"	...	...	...	...	...	...	...	...	9	...	...	1	...	...	...	...	...	1	...	...	...	1	1	1	1	99. 6	1	...	...	....	" Schmidt, Otto.
150	" 28	L. W. P., M. 21	"	...	1	...	...	...	1	...	...	2 y	...	...	...	...	...	...	...	1	...	...	...	1	...	1	1	1	97. 6	...	...	...	Patient in sixth week of typhoid; died two weeks later sup. peritonitis. Post mortem: seat of operation on appendix perfectly healed. Peritonitis from typhoid ulcer not perforated.	" " "
151	June 1	O'H., M. 24	"	...	...	...	1	...	...	1	...	5	...	...	...	1	...	...	...	1	...	...	...	1	...	1	1	1	101	1	...	...	....	" Conley, T. J.
152	" 4	A. M., F. 27	"	5	...	1	1	...	...	1	...	3	...	...	...	1	...	...	...	1	...	...	...	1	...	1	1	1	101	...	...	...	Abscess so small could not be located before operation.	" Conley, P. H.
153	" 10	N., M. 40	"	...	...	1	1	...	...	1	1	4	...	...	...	1	1	...	...	1	1	...	...	...	12	1	1	1	101	1	...	...	Patient a tippler; extremities cold, and pulse weak before oper'n.	" Rohr.
154	July 6	W., M. 50	"	...	...	1	1	...	...	1	...	4	...	...	...	...	...	1	...	...	1	...	...	1	34	1	1	1	99	1	1	...	Bowels excoriated; gloss absent.	" Conley, P. H.
155	" 6	A. L., M. 26	"	...	...	...	...	...	...	1	...	14	...	...	...	...	...	...	...	...	1	1	...	...	...	1	1	1	...	1	...	1	Abscess had opened into bowel previous to operation.	Alex. Bros. Hosp.
156	" 8	O., M. 45	"	...	...	...	...	...	...	...	...	8	...	...	...	1	...	...	...	...	1	...	...	...	1	1	1	1	99½	1	...	...	....	Dr. Conley, T. J.
157	" 9	G., M. 22	"	...	...	...	...	...	...	...	...	4	...	...	...	1	...	1	...	...	1	...	...	...	1	1	1	1	99	1	...	...	Patient's extremities and facial expression very bad at time of	" Thometz.
158	" 19	I. G., M. 16	"	...	...	1	...	...	...	1	1	9	...	...	1	...	...	...	...	1	...	...	...	...	1	1	1	1	100½	1	...	...	..... [operation.	" De Wolf.
159	" 23	T., M. 19	"	1	...	...	...	...	...	1	...	3	...	...	1	...	...	...	...	...	...	...	...	...	1	1	1	1	101	1	...	...	Same as case No. 101 in previous report.	" Jennings.
160	" 24	G. G., M. 18	"	...	...	1	1	...	...	1	1	4	...	...	...	...	...	...	1	...	1	...	...	...	1	1	1	1	...	1	...	...	....	Alex. Bros. Hosp.
161	" 25	C., M. 28	"	...	...	1	1	...	...	1	...	7	...	...	1	...	...	...	1	...	1	...	...	...	1	1	1	1	...	1	...	...	Abscess situated under border of liver and over kidney.	Dr. Verity, W. P.
162	Aug. 6	S., F. 16	"	...	1	...	...	...	1	...	...	2	...	...	...	...	...	...	1	...	...	...	...	...	1	1	1	1	104	...	...	...	Appendix very much enlarged; typhoid ulcer.	[ford.
163	" 7	McG., F. 42	"	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	Canal in appendix entirely obliterated.	
164	" 17	R. M. 50	"	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...	1	1	1	98. 4	1	...	...	Chill; very large abscess.	Dr. Riching, Rock-
165	" 24	A. S., M. 22	"	5	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	Drainage; rapid convalescence.	" Hadsel, Elgin, Ia.
166	Sept. 4	M. D., F. 6	"	...	...	1	...	...	...	1	1	4	...	...	...	...	...	...	...	1	...	...	...	1	...	1	1	1	100	1	...	...	Enterolith very large.	" Cullin.
167	" 4	J. C. K., M. 35	"	...	...	...	...	...	...	...	...	10	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	1	99. 5	1	...	...	..... [pus all over.	" Whitford.
168	" 5	W. B., M. 14	"	2	...	1	1	...	1	1	1	5	...	...	...	...	1	...	...	...	1	...	...	1	...	1	1	1	99. 5	1	...	...	Peristalsis present. Normal gloss on intestine notwithstanding	[(Niles.)
169	" 9	A. J., M. 20	"	...	...	1	1	...	...	...	...	6	...	...	...	1	...	1	...	1	...	...	...	1	...	1	1	1	103. 6	1	...	...	Appendix situated over spine at brim of pelvis.	Alex. Bros. Hosp.
170	" 9	F., M. 19	"	...	...	1	1	...	1	...	1	33 h	...	...	...	...	...	1	...	1	...	...	...	1	...	1	1	1	102	...	...	...	Pulse 140 at time of operation; peristalsis absent. Appendix opened into cavity without adhesions.	" Berry, J. G.
171	" 11	B., F. 11	"	...	...	...	...	...	...	1	1	7	...	..	...	1	...	...	...	...	...	...	...	1	...	1	1	1	99½	1	...	...	.....	" Idbert, Indianapolis
172	" 13	M., F. 14	"	...	...	...	...	...	...	...	...	10	...	...	...	1	...	...	1	...	...	...	...	1	48	1	1	1	103	1	...	..	Had chill before operation; great pain and tenderness following. Peritonitis continued till death.	" Riley and Berry.
173	" 22	D. D., M. ...	"	11	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	.....	" Conley.
174	" 22	A. E., M. 28	"	...	...	...	...	...	...	...	...	5	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...	1	101. 5	1	...	...	Worried with pain and tenderness up to day before operation.	" Thometz.
175	" 26	G. T. H., M. 24	"	1	...	...	...	...	...	...	...	6	...	...	...	1	...	...	...	1	...	...	...	1	...	1	1	1	103	...	...	...	Peristalsis absent; ap. gangrenous; not perfor.; 1 oz. pus around	" James G. Berry.
176	" 27	A. H., M. 8½	"	...	...	1	1	...	1	1	...	4	...	...	...	1	...	...	...	...	1	...	...	1	...	1	1	1	100	...	...	...	absent; ap. gang.; perforated. [appendix.	" Pigall.
177	Oct. 14	J. C., M. 18	"	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	.....	" Harrigan.
178	" 16	C. E., M. 37	"	1	...	...	1	...	1	...	...	21	...	1	...	...	...	...	...	1	...	...	...	1	...	1	1	1	98. 4	...	...	...	present; " two perfor.; abs. opened into bowel; prev. opr.	" G.
179	" 21	B. P., F. 21	"	12	1	...	...	1	...	...	...	36 h	...	...	...	1	1	...	1	...	...	...	...	1	...	1	1	1	100. 5	...	...	...	absent; " covered with flakes of lymph. [1 yr. for abs.	" R. Connell.
180	" 23	B. P., M. 27	"	1	...	1	2	...	...	1	3	7 d	...	...	1	...	...	...	...	1	...	...	...	1	...	1	1	1	101. 7	...	...	...	present; " gang. at enterolith; 2 perfor. located around abd.	Alex. Bros. Hosp.
181	" 30	M. P., F, 16	"	10	...	1	2	...	...	1	...	...	...	...	...	1	...	...	...	...	1	...	...	1	...	1	1	1	101	...	...	...	" " " in center; easily shelled out. [wall.	Dr. I. C. Herb, P. G. H.
182	Nov. 6	R. A., M. 24	"	7	...	...	...	...	...	1	...	15 h	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...	...	...	...	...	...	" " " obliterat'd in 2 places, one at junc. of cecum.	" Bridge, St. Jos. "
183	" 8	C. B., M. 31	"	...	...	1	...	...	...	1	...	5 d	...	...	1	...	...	...	...	...	1	...	...	1	24	1	1	1	103	...	...	...	" " " gangrenous; much pus; bad expression.	" McQuaig.
184	" 10	M. T., F. 16	"	...	1	1	...	...	...	1	...	18 h	...	...	...	...	...	...	...	...	1	...	...	1	...	1	1	1	100	...	...	...	" " " " in mucous mem. not perfor. and removed without rupt. full of pus.	" J. H. Hoelscher.
185	" 20	C. E., M. 28	"	...	...	1	1	...	...	1	...	3	...	...	...	1	...	...	1	1	...	...	...	1	...	1	1	1	99. 8	...	...	...	absent; " part. gang. and perfor.; endothelium exfoliated; bowel red, blist.; 2 oz. pus, gauze and glass drain.	Cook County Hosp.
186	" 25	P., M. 10	"	...	...	1	1	...	...	1	1	8	...	...	...	1	...	...	...	1	...	...	...	1	...	1	1	1	99. 6	...	...	...	" " part. gang.; abscess completely circumscribed.	Dr. Linden.
187	" 26	B., F. 9	"	...	...	...	...	...	...	...	...	14	...	1	...	...	...	...	...	...	...	...	...	1	...	1	1	1	98	...	...	...	" " abscess opened and drained.	" Scholler.
188	" 26	P., M. 22	"	...	...	...	1	...	...	1	1	9	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	1	100	...	...	...	....[about 1 oz. pus.	" Symon.
189	" 30	W. K., M 10	"	...	...	...	1	...	...	1	1	50 h	...	...	...	1	...	...	...	1	...	...	...	1	...	1	1	1	100	...	...	...	" " gangrenous; pin-hole perfor.; large enterolith;	" Hoelscher.
190	Dec. 6	T., M. 17	"	1	...	...	...	...	...	1	...	8	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	1	102	...	...	...	" " located over promontory or sacrum several inches from abdominal wall; packed well and opened.	" Jennings.
191	" 6	M., M. 16	"	3	...	...	...	...	...	1	...	8	...	...	1	...	...	...	...	...	...	...	...	1	...	1	1	1	100	...	...	...	" Very large abs. most prominent in left side; opened extra-peritoneal; pus like tuberculous débris.	Alex. Bros. Hosp.
192	" 8	E., M. ...	"	...	...	...	...	...	...	1	...	10	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	1	99. 6	...	...	..	" Large abscess not adherent in front; appendix very firm and allowed to remain.	Dr. Eads.
193	" 10	B. S. O'C., M. 52	"	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	98. 8	...	...	...	Appendix infiltrated, dense; mesentery ½ inch thick, also infiltrated and cut off where the ligature was tied; mucous membrane ecchymotic and swollen; appendix firmly adherent to cecum; could not be bent upon itself without breaking.	" Dr. Dinnen, Fort Wayne.
194	" 15	J. T. S., M. 25	"	1	...	...	...	...	...	1	...	23 h	...	...	...	...	...	...	...	1	...	...	...	1	...	1	1	1	102	...	...	...	Wall of appendix very much enlarged; full of pus; mucous membrane gangrenous; ready to perforate.	